HYTEC Engineering Capabilities

HYTEC Overview
ATW - ADNA/HYTEC Team
Current Engineering Programs

T. Thompson

HYTEC, Inc.

ATW and HYTEC

A Synergistic ADNA/HYTEC Team

- Natural blending of physics and engineering organization
- Bring together team dedicated to development of an ATW system

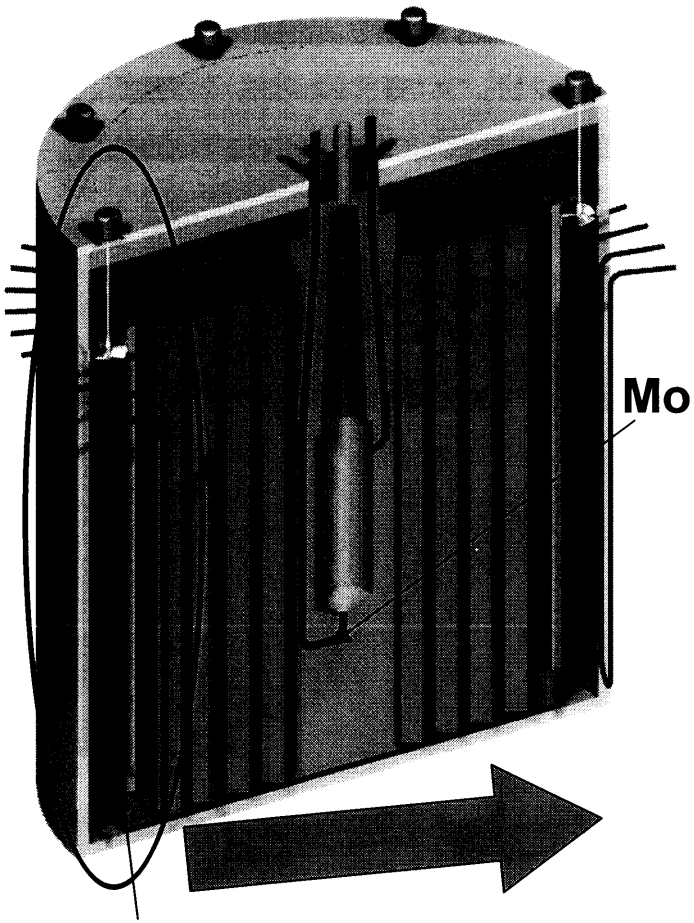
ATW and HYTEC

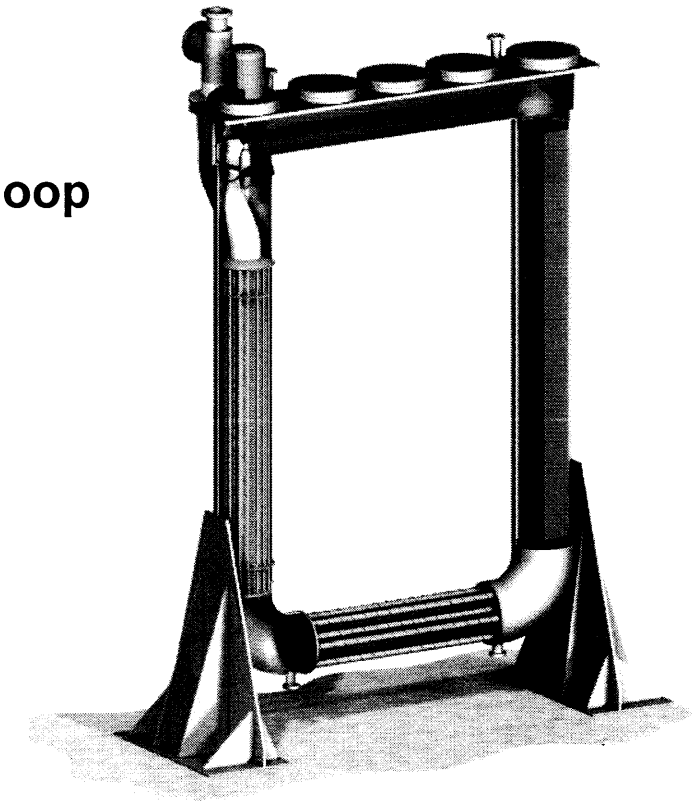
In-House Study of a Molten Salt and Liquid Lead Flow Loops

Accelerator-Driven Transmutation of Waste

Desire: Proof-of-Principle Testing of:

- ***Primary and Secondary Flow Loops, and also the***
- ***Liquid Lead Flow Loop***





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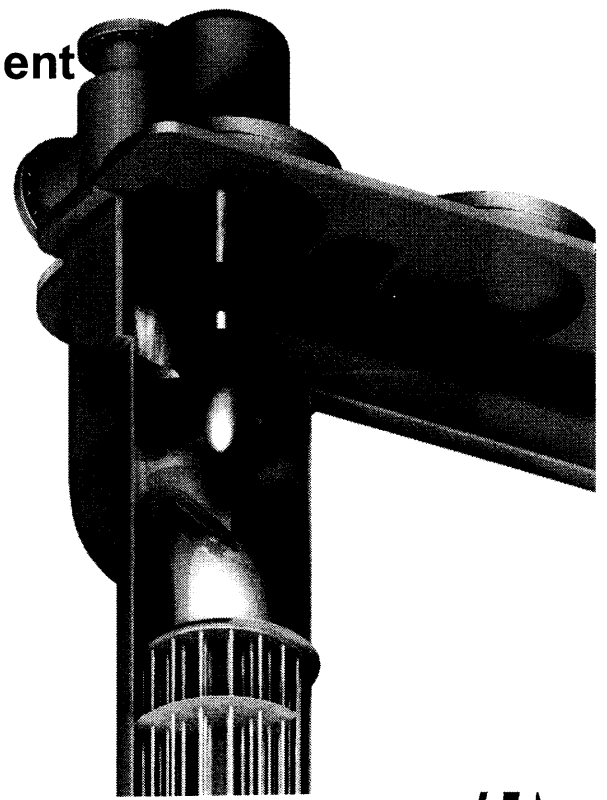
Experimental Loop Design Considerations

- Molten Salt Loop Performance
  - minimization of primary flow loop volume
    - heat exchanger performance is critical
      - chose counterflow heat exchanger approach for performance
      - flow distribution around tubes must be optimized for thermal and hydraulic performance
- Viability of internal constituents for molten salt
  - demonstrate Hastelloy-N material for containment
  - pF management evaluation (free fluorine)
- Start-up/Operation/Shutdown of overall system
  - information on maintainability of loop
  - clean-up procedures
  - pump demonstration and flow validation
  - general operational behavior
- Fission product disposition (using surrogates)
  - removal of noble gases
  - deposition of noble and non-noble metals



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Experimental Loop Design Considerations (cont'd)

- **Considerations for Liquid Lead**
  - **demonstrate corrosion control**
  - **demonstrate oxygen control and optimal level**
  - **evaluate effect of spallation product using dissolved surrogates**
  - **demonstrate means for removal of spallation product**
- **Collaborations**
  - **benefit from close Russian contacts as appropriate**
  - **possible exchange and collaboration with SRS and LANL on the Pb-Bi loop studies**

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Recent and On-going Programs

- LANL Engineering Support (through Task Order Agreement)
  - SNS (Spallation Neutron Source) ~ $350K
  - ATLAS (Pulsed Power) $390K
  - LANSCE $300K
- HYTEC Detector Programs
  - Gravity Wave Experiment-$4,000K Eng. 11,000K Hdw.
    - LIGO (CIT)
  - GLAST-$350K
    - UCSC/SLAC
    - NASA space based telescope with silicon
  - PHENIX Muon Detector-$250K
  - Pixel Detector-$800K
    - ATLAS (LBNL)
    - CMS (UC DAVIS)
  - Silicon Detector-$100K
    - CLEO (PURDUE)
    - ATLAS (UC SANTA CRUZ)
  - CERN Pixel Supports-$85K
- SBIR(s)- Detector Related-$850K
  - Carbon-Carbon cooling structures (DOE) Phase I and Phase II
  - Composite Tracker for Space Programs (NASA)

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Capabilities

- End-to-end system design, analysis, integration and testing
  - Design to customer specifications and requirements
  - Functional modeling prior to cost investment in final product fabrication: application of advanced CAD/CAE tools
  - Design for component compatibility at system interfaces
  - Remote site support
  - Rapid response and solution to on-site hardware problems
- Thermal//Hydraulic System Studies
  - CFD Analysis
- Thermostructure Design
  - Active Cooling/Passive Cooling
  - Advanced materials, high conductivity, etc.
- Precision mechanical hardware definition and design
  - Stable Optical Structure Design
  - Ultra-lightweight Structures
  - Composite Material Applications
  - 3D Rapid Prototyping
  - Innovative Designs
- TV holography (NDE non contact 3D shape-change measurement)
- Vibration Testing

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